ug/l = micro
per l
mg/l = milli
per m

Date

CONCERNS	LOCATION	EXISTING CONDITIONS	EFFECT OF PROPOSED ACTIONS
METALS			
Copper	Mouth of West Waterway and Lower Duwamish Peaks of sediment concentrations correspond with arsenic and zinc peaks	- EPA saltwater criteria; Chronic 4 ug/l Acute 23 ug/l - Up to 100 ug/l has been recorded in salt wedge & average is 18 ug/l - Sediment is 6 x's Puget Sound background - 81% of total load is from as yet undetermined sources	- Investigations should identify sources - Control actions shou reduce water column concentrations to below chronic criter and sediment concent tions should be simi to Puget Sound back- ground or show botto fish abnormalities close to Puget Sound background.
Lead	West Waterway	- EPA saltwater criteria Chronic 25 ug/l - Duwamish has 96 ug/l - Sediment is 22 x's higher than Puget Sound back- ground - Duwamish mussels have 30 x's Puget Sound background - 86% comes from as yet unidentified sources but Lander Street storm drain appears to be a major source.	Paving parking lots adjacent to RSR smelt will reduce lead dust on Harbor Island

ug/l=

mg/l=

CONCERNS	LOCATION	EXISTING CONDITION	EFFECT OF PROPOSED ACTIONS
METALS			
Mercury	Upper estuary head of navigation	- EPA chronic criteria is .1 ug/l (salt) - Salt wedge is .28 ug/l - Sediment is 12 x's Puget Sound background - Duwamish bottomfish livers have 3 x's Puget Sound background - 75% comes from upstream sources	Unknown Further source identification is necessary before controls can be developed and implemented.
Arsenic	East & West Waterways Peaks of sediment concentrations correspond with copper and zinc peaks	- Sediments are 22 x's Puget Sound background - 84% is from as yet undetermined sources	- Investigations should identify sources - Control actions should reduce sediment concentrations to Puget Sound background

CONCERNS	LOCATION	EXISTING CONDITIONS	EFFECT OF PROPOSED ACTIONS
Zinc	Mouth of West Waterway and lower estuary Peaks in sediment concentrations are similar to copper and arsenic	- Sediment is 7 x's higher than Puget Sound background - 53% is from as yet unidentified sources	- Further source identification is necessa before controls can be developed and implemented. - Controls implemented should reduce zinc levels in sediments to Puget Sound background levels.
PAH's (Polycyclic aromatic hydrocarbons)	High levels are found throughout river, but highest in West Waterway	- EPA cancer risk criteria is .93 ug/kg. Bottom fish livers 10 ug/kg and are 3 x's Puget Sound background (No data on flesh). - Sediments are 34 x's higher Puget Sound background - Invertebrate tissues are 8 x's higher - 99% is from unknown sources	Source identification is necessary. Once controls are implemented sediment concentrations should decline to Puget Sound background levels and/or bottomfish abnormalities should be close to Puget Sound background.
Sediment	Head of navigation	- Costs Corps $500,000 annually to dredge 150 million kg/yr. - 99% comes from upriver sources	Upstream sediment controls and river bank stabilization would red annual sediment load and dredging costs

ug/l=m
p
mg/l=m
p

CONCERNS	LOCATION	EXISTING CONDITIONS	EFFECT OF PROPOSED ACTIONS
Habitat (wildlife and intertidal)	- wildlife habitat is limited to Kellogg Island and a few isolated areas - juvenile salmonids need soft bottom habitat for rearing in the estuary.	Of original 640 acres in 1900, only 10 remain	- Protection of Kellogg Island and intertidal habitat - Re-establishment of marshes at head of navigation will increase habitat - Streambank planting will provide habitat for non-game wildlife
ORGANICS			
PCB's	Several locations along Duwamish Waterway	- Bottomfish flesh is 3 x's Puget Sound background. Livers are 12 x's. - Sediment is 65 x's higher than Puget Sound background - EPA cancer risk criteria is 2.5 ug/kg; Duwamish bottomfish have 560 ug/kg - 98% is from as yet undetermined sources	Source identification i necessary. Implementation of controls will continue reductions in sediment concentrations to Puget Sound background and fish flesh concentrations below cancer risk criteria

ug/l=m
p
mg/l=m
p

CONCERNS	LOCATION	EXISTING CONDITIONS	EFFECT OF PROPOSED ACTIONS
Pesticides (DDT, DDE, DDD aldrin, dieldrim, heptachlor, heptachlor oxide and chlorodane)	DDT is found throughout the river (other pesticides are very low)	EPA cancer risk for DDT is 1.3 ug/kg in fish tissue. Whole Duwamish bottomfish have 110 ug/kg DDT (muscle and liver) - Sediment DDT is 36 x's Puget Sound background, bottomfish livers are 300 x's, muscle is 2 x's. - 73% is from as yet undetermined sources	
Ammonia	From discharge of Renton Treatment Plant at Tukwila to head of navigation	- >90% of NH_3 in the river comes from RTP - EPA criteria of 20 ug/l has been exceeded during low flow conditions when salmon are migrating	No further action is necessary beyond Metro Council's decisions to remove Renton Treatment Plant effluent from the river.
Dissolved Oxygen	Surface waters and salt wedge especially above head of navigation.	- DOE standard (Class B waters): -FW 6.5 mg/l - Salt 5.0 mg/l - During low flow DO is 4 mg/l (FW) & 5.7 mg/l (SW) - Saltwater meets the standard but freshwater does not - Salmonid migration is delayed until release of Hanson Dam water in Sept.	Low flow augmentation will increase DO ∽.5 mg/L. Stream bank planting will shade water & decrease temperature & increase DO with other benefits (aesthetics, wildlife habitat)

CONCERNS	LOCATION	EXISTING CONDITION	EFFECT OF PROPOSED ACTIONS
Temperature	Peaks near Allentown especially in September. But is problem throughout river in summer months except for salt wedge which has adequate temperatures year round.	- DOE standard: -FW 21°C. -Salt 19°C. - In April-June, upper Duwamish/ lower Green has temperatures > 21°C. But most juveliles have already migrated. - In summer months temperatures > 21°C. are common from Auburn to upper Duwamish impacting year-round residents. - Migrating adults wait for Hanson Dam release for cooler water in Sept. Migration is delayed. - Saltwater wedge meets the standard year round	- Flow augmentation to 550 cfs is necessary to maintain temperatures < 21°C year round. - Streambank planting will shade river reducing solar effect.